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EXAMINER	
GOGIA, ANKUR	

ART UNIT	PAPER NUMBER
2187	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/748,307	TRIKA ET AL.	
	Examiner	Art Unit	
	Ankur Gogia	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/29/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The instant application, having Application No. 10/748,307, has a total of 23 claims pending in the application; there are 5 independent claims and 18 dependent claims, all of which are ready for examination by the examiner.

Oath/Declaration

2. The applicant's oath/declaration has been reviewed by the examiner and is found to conform to the requirements prescribed in 37 C.F.R. 1.63.

Information Disclosure Statement

3. As required by M.P.E.P. 609(c), the applicant's submission of the Information Disclosure Statement dated 29 December 2003 is acknowledged by the examiner and the cited references have been considered, with the exception of Cite No. 1, in the examination of the claims now pending. As required by M.P.E.P. 609(c)(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

4. Cite No. 1 was not considered since the publication date and inventor name associated with the given Document Number do not the publication date and inventor name given in the IDS. The examiner believes that the applicant's intended to cite document number 6,370,614 B1 rather than 6,730,614 B1, since the former document has a publication date and inventor matching that stated in the IDS. Applicant is advised that the date of any re-submission of any item of information contained in this

information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Claim Objections

5. Claim 6 is objected to because of the following informalities: As currently presented, claim 6 is a duplicate copy of claim 3 however, it is believed that the applicant intended for claim 6 to depend from claim 4 rather than from claim 1 and the examiner will interpret the claim as such. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 7-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 7 recites the limitation "the data allocation" in line 5. There is insufficient antecedent basis for this limitation in the claim. One possible suggestion for overcoming this rejection would be to restate the limitation as “a data allocation”.

9. Claim 14 recites the limitation "a date region" on line 2, where it is believed that the applicants intended to recite "a **data** region" and for the instant office action the examiner will interpret the claim as such.

10. All other claims rejected in ¶7 and not specifically discussed above, are rejected for inheriting the deficiencies of the claim(s) from which they depend.

Claim Rejections - 35 USC § 101

11. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

12. Claims 1-6 and 21-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

13. Claims 1 and 4 disclose methods of reserving a non-volatile cache comprising reserving first and second portions of the cache. As disclosed, the claims fail to produce a tangible result, as the reserving does not appear to act on the cache or any part of the system in any way. Therefore, the claims are directed towards non-statutory subject matter.

14. Claim 21 discloses an article of manufacture comprising a machine-readable medium having a plurality of machine-readable instructions. As disclosed, the claim may be interpreted to read on non-statutory subject matter. For example, the claim may be interpreted as a piece of paper **(machine-readable medium)** with instructions written on it **(having a plurality of machine-readable instructions)**. Page 10, ¶17 of the instant specification appear to suggest that the machine-readable medium is a medium

having instructions stored thereon, however, as stated, this appears to be merely a suggestion rather than a definition and therefore does not limit the claim to statutory subject matter. A possible suggestion for overcoming this rejection would be to amend the claim to recite "a machine-readable medium **storing** a plurality of machine-readable instructions".

15. Any claims rejected in ¶12 and not specifically discussed above are rejected for inheriting the deficiencies of the claim(s) from which they depend.

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. Claims 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Liao et al. (2002/0062424; hereinafter referred to as Liao).

Claim 21

Liao discloses an article of manufacture comprising:

A machine-readable medium having a plurality of machine readable instructions, wherein when the instructions are executed by a system, the instructions provide to manage a cache memory for:

Allocating a first portion of the cache memory **(¶17; second portion)** for application memory requests **(¶18; last line)** based at least in part on a predetermined

set of functions **(¶s 20,42)** that are supported by a driver for application calls **(¶17; The reference discloses that the second portion is a software controlled portion (i.e. having a driver supporting a predetermined set of functions))**; and

Initializing at least one byte of the first portion of the cache memory in response to the predetermined set of functions **(inherent; Liao does not expressly disclose a function to set or initialize the cache, however since the allocated portion can be written to there must a function that initialized data in the allocated portion)**;

Reading at least one byte of the first portion of the cache memory in response to the predetermined set of functions **(inherent; Liao does not expressly disclose a function to read from the cache, however since the allocated portion can be read from there must a function that reads data from the allocated portion)**; and

Deallocating at least one byte of the first portion of the cache memory in response to the predetermined set of functions **(¶46; dcbi and dcbf instructions)**.

Claim 22

Liao further discloses wherein the predetermined set of functions comprises: Allocate **(¶44)**, Get **(inherent; Liao does not expressly disclose a get function, however since the allocated portion can be read from there must a function that "gets" data from the allocated portion)**, Set **(inherent; Liao does not expressly disclose a set function, however since the allocated portion can be written to there must a function that "sets" data in the allocated portion)**, and Free **(¶46; dcbi and dcbf instructions)**.

Claim 23

Liao further discloses wherein the predetermined set of functions allow for direct or indirect application calls **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being obvious over Liao in view of "PowerPC Microprocessor Family: The Programming Environments for 32-Bit Microprocessors" (hereinafter referred to as PPC), with PPC being provided for extrinsic evidence, and Teoman et al. (6,370,614; Hereinafter referred to as Teoman).

Claim 1

Liao discloses a method for reserving a cache for explicit control by an application comprising:

Reserving a first portion of the cache **(¶17; second portion)** for application memory requests **(¶18; last line)** based at least in part on a predetermined set of functions **(¶s 20,42)** that are supported by a driver for application calls **(¶17; The**

reference discloses that the second portion is a software controlled portion (i.e. having a driver supporting a predetermined set of functions)); and

Reserving a second portion of the cache **(¶17; first portion)** for application memory requests **(¶18; last line)**.

Liao does not disclose expressly wherein the cache is a non-volatile cache.

Teoman discloses a non-volatile cache **(Fig. 1.25; Col. 3, Line 10)**.

Liao and Teoman are analogous art because they are from the same field of endeavor of software controllable cache.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Liao and Teoman before them, to use a non-volatile memory as a cache and couple the cache to a main memory and a disk.

The motivation for doing so would have been to improve the system boot time **(Teoman, Col. 3, Lines 10-17)**.

Therefore, it would have been obvious to combine Liao with Teoman for the to obtain the invention as specified in claim 1.

Claim 2

Liao further discloses wherein the predetermined set of functions comprises: Allocate **(¶44)**, Get **(inherent; Liao does not expressly disclose a get function, however since the allocated portion can be read from there must a function that "gets" data from the allocated portion)**, Set **(inherent; Liao does not expressly disclose a set function, however since the allocated portion can be written to**

there must a function that "sets" data in the allocated portion), and Free **(¶46; dcbi and dcbf instructions)**.

Claim 3

Liao further discloses wherein the predetermined set of functions allow for direct or indirect application calls **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**.

Claim 4

Liao discloses a method for reserving a cache for explicit control by an application comprising:

Reserving a first portion of the cache **(¶17; second portion)** for application memory requests **(¶18; last line)** based at least in part on a predetermined set of functions **(¶s 20,42)** that are supported by a driver for application calls **(¶17; The reference discloses that the second portion is a software controlled portion (i.e. having a driver supporting a predetermined set of functions))**; and

Liao does not disclose expressly wherein the cache is a non-volatile cache or reserving a second portion of the cache to be used as a disk cache.

Liao and Teoman are analogous art because they are from the same field of endeavor of software controllable cache.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Liao and Teoman before them, to use a non-volatile memory as a cache and couple the cache to a main memory and a disk.

The motivation for doing so would have been to improve the system boot time **(Teoman, Col. 3, Lines 10-17)**.

Therefore, it would have been obvious to combine Liao with Teoman for the to obtain the invention as specified in claim 4.

Claim 5

Liao further discloses wherein the predetermined set of functions comprises: Allocate **(¶44)**, Get **(inherent; Liao does not expressly disclose a get function, however since the allocated portion can be read from there must a function that "gets" data from the allocated portion)**, Set **(inherent; Liao does not expressly disclose a set function, however since the allocated portion can be written to there must a function that "sets" data in the allocated portion)**, and Free **(¶46; dcbi and dcbf instructions)**.

Claim 6

Liao further discloses wherein the predetermined set of functions allow for direct or indirect application calls **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**.

Claim 7

Liao discloses a cache **(Fig. 1.32,34)** coupled to a main memory **(Fig. 1.12)**; and

The cache to support a predetermined set of functions **(¶s 20,42)** that are supported by a driver for application calls **(¶17; The reference discloses that the second portion is a software controlled portion (i.e. supported by a driver))** and a

bit is set and cleared per affected cache-line in the cache-line metadata in the cache **(¶54, Lines 19-24)** and the data allocation is done on a cache-line granularity **(¶44)**.

Liao does not disclose expressly wherein the cache is a non-volatile cache, and is coupled to a main memory and a mass storage.

Teoman discloses a non-volatile cache **(Fig. 1.25; Col. 3, Line 10)**, coupled to a main memory **(Fig. 1.16)** and a mass storage **(Fig. 1.26,28)**; and

Liao and Teoman are analogous art because they are from the same field of endeavor of software controllable cache.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Liao and Teoman before them, to use a non-volatile memory as a cache and couple the cache to a main memory and a disk.

The motivation for doing so would have been to improve the system boot time **(Teoman, Col. 3, Lines 10-17)**.

Therefore, it would have been obvious to combine Liao with Teoman for the to obtain the invention as specified in claim 7.

Claim 8

Liao further discloses wherein the predetermined set of functions comprises: Allocate **(¶44)**, Get **(inherent; Liao does not expressly disclose a get function, however since the allocated portion can be read from there must a function that "gets" data from the allocated portion)**, Set **(inherent; Liao does not expressly disclose a set function, however since the allocated portion can be written to**

there must a function that "sets" data in the allocated portion), and Free **(¶46; dcbi and dcbf instructions)**.

Claim 9

Liao further discloses wherein the predetermined set of functions allow for direct or indirect application calls **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**.

Claim 10

Liao further discloses wherein the apparatus is to be implemented in either: a memory controller, a chipset **(¶s 31,32; Microprocessor)**, or an application specific integrated circuit (ASIC).

Claim 11

Liao further discloses wherein the cache, in response to an Allocate function, will:

Determine whether a predetermined number of bytes can be reserved **(inherent; In order to reserve space in a cache, an algorithm will determine if there is enough space to hold the data)**,

If so, to identify cache-lines to use to reserve the predetermined number of bytes, flush the cache-lines if they are dirty and mark them empty **(inherent; This is inherent to a cache. When data is written to a cache, and space is needed to store the data, dirty cache lines are removed to create space for the new data)**,

Pin these cache-lines **(PPC Pg. 8-42; The dcba instruction marks a block as valid once it is allocated)**, and

Return a pointer to a structure that identifies the cache-lines reserved for this request **(inherent; Once a block is allocated, there must be a reference to the block returned in order for the data to be accessed at a later time)**.

Claim 12

Liao further discloses wherein the non-volatile cache, in response to a Set function, will:

Determine that input parameters are valid (not null) and a data region referenced is in range **(inherent; When writing to a cache, it must be verified that the input for the write is valid and the region referenced is within a valid range of the address space in order to perform the operation)**,

Identify the cache-lines to use **(inherent; If writing data to a cache, the lines that are going to be written to must be identified for the data to be written)**,

Copy data from a data Buffer to the applicable cache lines and mark the lines valid (not empty) **(inherent; When writing data to the cache, the cache contains a bit to identify the data as being valid)**.

Claim 13

Liao further discloses wherein the apparatus is supervised by a driver in a software algorithm **(The reference discloses that the second portion is a software controlled portion (i.e. having a driver supporting a predetermined set of functions))**.

Claim 14

Liao further discloses wherein the non-volatile cache, in response to a Get function, will:

Determine that input parameters are valid (not null) and a data region referenced is in range **(inherent; When reading from a cache, it must be verified that the input for the read is valid and the region referenced is within a valid range of the address space in order to perform the operation)**,

Identify the cache-lines to use and determine if they are valid (not empty) **(inherent; When reading data from a cache the lines that hold the data must be identified in order to get the data and the data is verified as to its validity in order to prevent obtaining invalid data)**, and

Copy data from the applicable cache lines into a data Buffer **(inherent; When data is read from a cache, it must be placed in a buffer as data has to be stored in some location to be used)**.

Claim 15

Liao further discloses wherein the cache, in response to a Free function, will

Determine that input parameters are valid **(inherent; When accessing a cache, it must be verified that the input for the access is valid)**

Unpin the cache lines,

And mark the cache lines as invalid **(PPC 8-44; The dcbf instruction flushes the allocated cache portion and invalidates the referenced line)**,

Claim 16

Liao discloses a cache **(Fig. 1.32,34)** coupled to a main memory **(Fig. 1.12)**; and

The cache to support a predetermined set of functions **(¶s 20,42)** that are supported by a driver for application calls **(¶17; The reference discloses that the second portion is a software controlled portion (i.e. supported by a driver))** and the cache is specifically utilized for an application **(¶53)** and the cache does not require pin bits **(¶19; In the reference, it is disclosed that a special register is used to indicate locked cache lines)**.

Liao does not disclose expressly wherein the cache is a non-volatile cache, and is coupled to a main memory and a mass storage.

Teoman discloses a non-volatile cache **(Fig. 1.25; Col. 3, Line 10)**, coupled to a main memory **(Fig. 1.16)** and a mass storage **(Fig. 1.26,28)**; and

Liao and Teoman are analogous art because they are from the same field of endeavor of software controllable cache.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Liao and Teoman before them, to use a non-volatile memory as a cache and couple the cache to a main memory and a disk.

The motivation for doing so would have been to improve the system boot time **(Teoman, Col. 3, Lines 10-17)**.

Therefore, it would have been obvious to combine Liao with Teoman for the to obtain the invention as specified in claim 7.

Claim 17

Liao further discloses wherein the predetermined set of functions comprises: Allocate **(¶44)**, Get **(inherent; Liao does not expressly disclose a get function, however since the allocated portion can be read from there must a function that "gets" data from the allocated portion)**, Set **(inherent; Liao does not expressly disclose a set function, however since the allocated portion can be written to there must a function that "sets" data in the allocated portion)**, and Free **(¶46; dcbi and dcbf instructions)**.

Claim 18

Liao further discloses wherein the predetermined set of functions allow for direct or indirect application calls **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**.

Claim 19

Liao further discloses wherein the apparatus is to be implemented in either: a memory controller, a chipset **(¶s 31,32; Microprocessor)**, or an application specific integrated circuit (ASIC).

Claim 20

Liao further discloses wherein in response to the predetermined set of functions, Reserve a section of the cache for the application **(¶17; second portion)**,

invoking a cache manager **(¶54; In the reference, it is disclose that the software interface to the cache allows for use by application programmers. (i.e. the functions can be called directly))**

Liao does not disclose expressly, wherein the cache manager is stored on a partition of the cache.

Teoman discloses using a portion of cache to store program code **(Col. 3, Lines 10-16)**

Liao and Teoman are analogous art because they are from the same field of endeavor of software controllable cache.

At the time of the invention it would have been obvious to a person of ordinary skill in the art, having the teachings of Liao and Teoman before them, to store the cache manager on the cache.

The motivation for doing so would have been to improve the system boot time **(Teoman, Col. 3, Lines 10-17)**.

Therefore, it would have been obvious to combine Liao with Teoman for the to obtain the invention as specified in claim 20.

Conclusion

20. The following is a summary of the treatment and status of all claims in the application as recommended by M.P.E.P. 707.07(i):

Per the instant office action, claims 1-23 have received a first action on the merits and are subject of a first action non-final.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ankur Gogia whose telephone number is 571-272-4166. The examiner can normally be reached on M-F 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ankur Gogia
Examiner
Art Unit 2187

2/17/06

DONALD SPARKS
SUPERVISORY PATENT EXAMINER